TWELVE YEARS

IN THE

MINES OF CALIFORNIA

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TWELVE YEARS

IN THE

MINES OF CALIFORNIA.

TWELVE YEARS

IN THE

MINES OF CALIFORNIA;

EMBRACING

A General View of the Gold Region,

WITH

PRACTICAL OBSERVATIONS ON HILL, PLACER, AND QUARTZ DIGGINGS;

AND

NOTES ON THE ORIGIN OF GOLD DEPOSITS.

BY

LAWSON B. PATTERSON.

CAMBRIDGE:
PRINTED BY MILES AND DILLINGHAM.
1862.

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INTRODUCTION.

In presenting to the public some of the results of my experience and observations during twelve years passed in the mines of California, I beg to state that, originally, it formed no part of my intention to write a book upon the subject. I went forward simply, in the first instance, as did thousands of others, to try my fortune in the new regions of enterprise which had been opened to my countrymen. I went determined to persevere in the path I had chosen; and from my first landing upon the shores of California until now, I have steadily pursued it, with what devotion may be gathered from the following testimonial, which was printed in the *Alta California* on the morning of the day when I left California on my first visit to my native place. I publish it here without any affected diffidence or apology. It is a statement I have fairly earned, and will serve as my credentials to authorize me in asking the confidence of the public in my book: —

"If the State of California were hunted through, it would not be possible to find a miner who had stuck to his business longer or more steadily than Mr. L. B. Patterson. He arrived in this city on the 20th of July, 1849; started for the mines six days later; went to Mormon Island, and after a short stay, to the vicinity of Georgetown, El Dorado County, where he remained twelve years, never abandoning mining in all that time. He is one of the few *Forty-niners* who have remained faithful to the business of mining, and kept steady. In the summer of 1850, about one-fourth of the miners worked in the beds and bars of rivers; the other three-fourths in cañons and gulleys. The diggings were then all shallow. Two years later, tunneling for hill diggings commenced; and in 1855 quartz mines became a regular branch of mining in that county. About one-tenth of the miners are now engaged in quartz, which pays more in proportion to the number of men engaged, than any other branch of labor, and is looked upon as the only kind of mining that can be considered as permanent in El Dorado County.

"Mr. Patterson sails in the steamer this morning for his native place (which is Boston), intending to return again to his California home. He has an interest in a valuable quartz claim, which he does not intend to abandon."

During the years thus employed, I was repeatedly struck with evidence, that my extensive labor in all kinds of diggings elicited, concerning the igneous origin of gold. It has always been an inquiry of more or less scientific importance — the origin of the gold deposits. Geological writers, with one accord, ascribe its presence, where we find it, to the action of water; but their reasonings and deductions are singularly at variance with the unanimity of their conclusions; at variance, also, with the unanimous expression of opinion, that the geological structure of the auriferous drifts and fields has yet to be satisfactorily explained. Under these circumstances, and where savans are in doubt and doctors disagree, it will not be deemed presumptuous, I trust, for a plain, practical, unscientific man to come forward and offer his theory, formed during months and years of labor and meditation, in the very gold regions that the geologists themselves, lament, have not been by them satisfactorily elucidated. Peradventure my humble contribution may assist them in bringing a profound mineralogical fact to light, and in establishing the theory, beyond cavil or dispute, that *the Gold Fields of California have a volcanic origin, and the gold deposits have their place in consequence of volcanic upheavals.*

I will not extend this introduction. I refer to the

body of the work for my manner of illustrating the volcanic theory; for a brief survey of the gold regions; for practical views on Hill, Placer, and Quartz Diggings; for succinct view of the structure of the gold region; and for interesting and useful information to persons who may be proposing to emigrate to the mines.

I am induced to add the following testimonials from my townsmen in California, who presented it voluntarily upon the occasion of my leaving them for my present visit home.

"*To all whom these may come:*—

"We take pleasure in recommending our esteemed friend and fellow-townsman, L. B. Patterson, to any community in which circumstances may place him.

"Mr. Patterson has lived in our vicinity since 1849, during which time he has been constantly engaged in mining; and during all of which period he has sustained an untarnished reputation.

"*Georgetown, El Dorado County, California,*
Sept. 4, 1861.

"Francis Graham,	Jared Turner, M. D.,
Saml. P. Nye,	G. W. Fountain,
B. A. Woodworth,	Thos. B. Patten,
C. Cole,	Alexander Connell,
J. M. Cushing,	Richard Murphy,
Chas. Kelsey,	Wm. T. Gibbs,
A. N. Peters,	D. W. Bowker,

S. H. Pinkham, Saml. Currier,
Wm. H. Pratt, Jas. W. Shanklin,
John I. Spear, Jr., John W. Wagner."

With these remarks, and these testimonials from my friends, to serve as letters of introduction to the public, I send my little work forth.

L. B. Patterson.

Boston, April, 1862.

TWELVE YEARS

IN THE

MINES OF CALIFORNIA.

CHAPTER I.

THE DISCOVERY OF GOLD.

The discovery of gold in California was like the discovery of a new world, for the exercise of the surplus energy, industry, and ingenuity that began to find themselves circumscribed in the routine that life had fallen into in the industrial nations. It also awaked a spirit of daring and a love of adventure. It opened a new and enticing page in our experience. It offered romantic excitements for a plodding life. And, above all, it appealed to the strongest passion of humanity — the love of gain — with bountiful promise for its full gratification. These considerations, addressed to individual minds, exerted a powerful and controlling influence. And the first emotions of amazed

surprise had scarcely subsided, before a movement was in progress that is scarcely less remarkable than was the exodus of the Israelites from the land of Egypt. The rocks of California had been struck, and gold poured forth. This was enough. There was no question as to the hardship, danger, deprivations, sufferings, and, peradventure, death, that must be encountered. Gold to be had for the mere trouble of picking it up, was the reward men proposed to themselves, and all other questions and inquiries were irrelevant and foreign to the purpose. So they went boldly and unwaveringly forward into an unknown and pathless country; many of them taking their wives and little ones and household goods with them; turning their backs upon home and friends forever, perhaps, but nothing daunted by the thought, buoyed up and sustained by the hope that the gold they should find would enable them to build a new and better home in the promised land.

Doubtless the new fields of Ophir and rivers of Pactolus, that had been opened to the enterprise of the world, attracted hosts of adventurers and desperate characters from every country. This is one of the penalties new colonies must pay, whose chief attraction in the outset is auriferous fields. But it would be unjust to the majority of the early emigrants to say that this

partook of the character of desperadoes. Community was strangely formed there; the amenities of life were not much regarded; rough and severe manners were prevalent; the law of might stood for the law of right in too many instances, and very few regarded their neighbor's convenience, in the passion which absorbed every mind, and swallowed up every other emotion — the passion for gold-finding, which so soon brings out in strongest features the selfishness of man.

But the rapidity with which society was organized, order restored, and law and equity resumed the balance between man and man, shows the inherent good qualities of the early emigrants. Natural justice soon created good laws, and the State was established on a sound basis. Their first adventures proved themselves worthy to be founders of a State; they have laid its foundations deep and strong. And an Empire of freemen has risen upon the shores of the Pacific, rich in the highest civilization; in all that arts or science can contribute; in a lofty morality and a benign faith, which, stretching forth its hands, will reach to the ancient Orient, bearing its treasures, not of silver and gold, but of progress and improvement; of education and morals; of modern civilization and of Christian truth, thus circling the world with those influences in which alone rest the hopes of the world.

The writer of the following pages was one of the earliest emigrants to California, and he proposes to offer to new settlers some of the results of his observations and experience in the mines, for their guidance and direction. An experience of twelve years of close labor and constant observation in the mines, particularly in what are called *Hill and Placer*, or Surface Diggings, authorizes him, he trusts, to speak with some degree of confidence and authority, when submitting his opinions.

But first, however, it seems appropriate to give a brief account of the discovery of gold in California. The country, always interesting to naturalists from its earliest history, had been explored and re-explored by men of science. Geologists had examined its surface with minute care, and fixed the character of its formation. Religious communities had been established there, which possessed a controlling influence over the Indians. Men of learning and observation, of enterprise and sagacity, of studious and of industrious habits, of adventurous habits, and of courage, had sought the shores of California, and made its placers and mountains and rivers their familiar home. The Indians frequently brought to these strangers specimens found in the ravines, and curiosities from the mountains. Animals, birds, plants, young trees, wild plants, pipe-clay, speci-

mens of stone and minerals in great variety, *but never a piece of gold.* And so the land lay with uncounted millions in its bosom, while those who walked above it were unconscious, happily unconscious, it may be, of the golden treasures that rested beneath their feet. This seems all the more singular too, since geologists and other intelligent observers had seen and noted, years and years before, all the signs and indications which accompany auriferous deposites, and had made these indications the subject of special comment.

It was the first day of January, 1848, when the gold was discovered at Coloma.* Gen. John August Sutter, the famous old pioneer, whose settlement at the old fort near Sacramento City, is now so widely and historically known as "Sutter's Fort," gives a simple and interesting account of the discovery. He had determined to build a saw-mill at Coloma, and employed a mill-wright, James W. Marshall, of New Jersey, to build it. Mr. Marshall was also engaged in building mills on his own account. But we will let Gen. Sutter tell the story that has resulted in such amazing consequences, in his own simple, but forcible language:

"It was a rainy afternoon when Mr. Marshall arrived at my office in the Fort, very wet. I was somewhat

* The Indian name and pronunciation is Cul-lu-mah, (beautiful vale,) now Americanized Coloma.

surprised to see him, as he was down a few days previous. He told me then that he had some important and interesting news that he wished to communicate secretly to me, and wished me to go with him to a place where we should not be disturbed, and where no listeners could come and hear what we had to say. I went with him to my private room; he requested me to lock the door. I complied, but told him at the same time, there was nobody in the house except the clerk, who was in his office in a different part of the house. After requesting something of me which my servant brought and then left the room, I forgot to lock the door, and it happened that the door was opened by the clerk just at the moment when Marshall took a rag from his pocket, showing me the yellow metal. He had about two ounces of it; but how quick Mr. Marshall put the yellow metal in his pocket again can hardly be described.

"The clerk came to see me on business, and excused himself for interrupting me. As soon as he had left, I was told, 'Now lock the door: didn't I tell you we might have listeners?' I told him he need not fear that; but I could hardly convince him he need not be suspicious. Then Mr. Marshall began to show me this metal, which consisted of small pieces and specimens, some of them worth a few dollars. He told me that he

had expressed his opinion to the laborers at the mill, that this might be gold; but some of them were laughing at him and called him a crazy man, and could not believe such a thing."

Sutter, after proving the metal with aqua-fortis, and some other experiments, and after reading the article "Gold," in the Encyclopedia Americana, pronounced the specimens before him gold of the finest quality, of at least twenty-three carats. After this Marshall had no more rest or patience, and wanted Sutter to start with him at once for Coloma. It being night, Sutter declined, but promised to accompany him in the morning. Mr. Marshall only replied, "Will you come in the morning?" and on receiving an affirmative answer, started again on his return journey, in the heaviest rain, although already very wet, and having had nothing to eat.

"I took this news," continued Mr. Sutter, "very easy, but thought a good deal during the night about the consequences that might follow such a discovery, and left the next morning for Coloma, in a heavy rain. About half way on the road I saw at a distance a human being crawling out from the brush-wood. When I came nearer I found it was Marshall, very wet. He had been to Coloma, (fifty-four miles,) took his other horse, and had returned to meet me. We

rode to the new El Dorado, and in the afternoon, the weather clearing up, made a prospecting promenade. The next morning we went to the tail-race of the mill, through which the water was running during the night, to clean out the gravel which had been made loose, for the purpose of widening the race. After the water was out we went in and searched for gold. This was done every morning. Small pieces of gold could be seen remaining on the bottom of the clean washed bed rock. I went into the race and picked up several pieces; several of the laborers gave me some which they had picked up, and from Marshall I received a part. I have had a heavy ring made of this gold, with my family's coat of arms engraved on the outside, and on the inside is engraved, "*The first gold discovered in January*, 1848."

It was attempted by Mr. Sutter, to keep this discovery a secret only six weeks, that he might perfect some of his plans. But a secret like this burns. It speedily leaked out. Sutter's laborers all left him. The gold fever raged vehemently; and having broken out, it was not stayed until, like the cholera, it had made the circuit of the land. All the men but five, in the then village of San Francisco, rushed to the mines; and soon what was a few months before a wilderness, became populous with adventurous miners.

Mr. Marshall, the undoubted discoverer of the gold, also gives a statement, not differing in any material facts from that quoted above from Gen. Sutter. He mentions one additional circumstance, however, that is interesting and worthy of being held in remembrance by both the English and American public. It is this. Mr. Hargrave, the discoverer of gold in Australia, was mining in Coloma in the summer of 1849, and went to Sutter and Marshall's mills for some lumber. As he and Marshall were conversing, Mr. Hargrave mentioned the fact that he was from Australia. "Why, then, replied Marshall, "do you not go and dig gold among your mountains? From what I have heard of that country, I have no doubt whatever that you would find plenty of it there." Hargrave was forcibly impressed with the hint; went to Australia, with what result, the millions which have been added to the circulation of the world, bear witness. Mr. Hargrave for his discovery received $75,000 bounty from the British and Colonial Governments. Mr. Marshall, who not only discovered the California gold, but indirectly the gold fields of Australia, has received no reward, and is sinking to old age in poverty; despoiled of every foot of land he possessed, and dependent upon the charity of comparative strangers, even for a cabin in which to rest his head at night. And these are the

wreaths of honor we bestow upon one whose instrumentality has opened uncounted treasure to the world. It is a burning shame and disgrace to the government of California that this story concerning Mr. Marshall is allowed to go uncontradicted. He has every right and claim to a pension. Why is it not granted? Why do not the United States, which have been benefitted immensely through the services he has rendered, vote him a grant of land and money, so that he may not be reduced to beg his bread, in his old age, from door to door. Alas! for our forgetfulness of those who have done so much to the nation. A grant of $100,000 by the United States Government to Mr. Marshall or his heirs, would be a graceful and gracious acknowledgment of his most important services. Gen. Sutter, too, who bore so conspicuous a part in the discovery whose name is forever identified with it, found himself absolutely impoverished in his old age; annoyed with contentions and law suits innumerable,—simply in trying to hold his own.

This is the simple story of a discovery which has led to such momentous consequences; which, quite as much as the discovery of Columbus, has stimulated the energy, enterprise, and daring of all nations; which has trebled the stock of the precious metal in the world; which has opened a vast extent of country, rich in fertility,

and abounding in resources, to the embrace of culture and civilization, and which has planted a glorious empire upon the extensive West, that promises a full realization of the prophetic lines of Bishop Berkeley: —

> "Westward the Star of Empire takes its way: —
> The four first acts already past;
> The fifth shall close the drama of the day —
> Time's noblest triumph is its last."

CHAPTER II.

THE GOLD REGION.

Before entering upon a record of personal experience and observation, let me give my readers a rapid survey of the gold region. That which is now known as the Gold Region, embraces a territory some five hundred miles long, and from ten to one hundred and fifty miles broad, — about as large as the whole extent of New England. If we enter the Gold Region by way of Stockton, we find that that place is built on the margin of a slough of the river upon which it is situated, and is upon alluvial clay. This clay soon gives place to close and more gravelly materials of the long slope of the valley which reaches up to the foot hills of the mountains. The slope has a gentle upward inclination for about twenty miles, without a single hill to break the surface. At a distance of twenty miles from Stockton, the surface undulates, and long hills of slight elevation appear. Horizontal strata crop out in long

lines on their sides. When Stanislaus River is reached, the hills are no longer low, but rise high above the stream, forming almost precipitous banks, in which the strata are distinctly exposed. These lie piled together nearly two thousand feet thick, and the nearly horizontal edges may be traced for miles.

Mining operations are conducted all along this part of the Stanislaus, and the tributary ravines, in the river-drift or gravel and sand of its bed and shores. Crossing the river, the country is open and undulating, and there are but few trees. Green grass and grass-covered slopes succeed to the bare and parched hills. At Montezuma, and in the vicinity, there are extensive alluvial flats, from which much fine gold is taken. Jamestown, three miles beyond Montezuma, is a thriving mining place. Wood's Creek, upon which it is situated, was one of the richest for its extent in California, and celebrated for its yield of gold. The next town is Sonora, which, though far in the mountains, is one of the largest and most thriving towns in the mining districts south of Mokelumne Hill. The veins in this region trend N. and N. 22° E., and the quartz contains cairties stained black with oxides of iron and manganese. In many specimens the gold is distinctly visible, but in general the quartz is so stained the gold does not appear.

Proceeding from Sonora, we conduct you through

Shaw's Flat, Springfield, and Columbia. We pass extensive outcrops of white lime stone, and the town of Columbia is built upon this formation. The limestone is peculiarly compact and finely granular, and is seamed and veined with blue, forming a marble of good quality. The gold from this vicinity is very fine. It is nearly all taken from the deep crevices and fissures of the limestone, at variable depths from the surface — from four to twenty-five feet. Gold is found, also, in a stiff blue clay, at the bottom and sides of the spaces between the vertical crags of the limestone. A part of this clay is exceedingly rich in fine gold, but its tenacity and toughness prevents the gold from being readily washed out. The clay is, therefore, raised to the surface, spread out to dry in the sun, and is afterwards pulverized. As we proceed on, granite and white limestone are observed, intercalated with mica slate in thin layers. The grove of "Big Trees," now so celebrated, lays in our way, and we pass through it. The surface is more undulating. The forests are dense with white pine, towering up as straight as liberty poles for two hundred feet or more. The soil is rich and deep and there are few outcrops of rock. The absence of underwood permits the surface to be seen for a great distance. These giant pines stand widely apart, and are free from limbs up to a height of fifty or seventy

feet and more. The scene they present is indescribably grand. The surface is moulded on a scale commensurate with this mighty forest. It rises in graceful swells, miles in extent, into mountain-like elevations, so smooth and rounded that a carriage may be driven almost anywhere among these lordly trees. One is said to be three hundred and sixty-three feet in height; and an old one lying prostrate, and much decayed, appears to have been upwards of four hundred feet high. It has been stated that these trees are about three thousand years old; but a more careful examination leads to the belief that they could not have been above twelve hundred years in obtaining their growth.

From the Mammoth Grove, over the hills for about eighteen miles, we come to *Cave City*, a mining town, near a great cave in the lime stone. Granite is the chief underlying rock for the greater part of the way: but round blocks of basalt are strewn over the surface. The descent from the regions of the trees is rapid. At the foot of a long hill you come suddenly upon an immense mass of quartz rock jutting out from the side of the mountain, and rising some fifty or sixty feet above the road. This mass forms a sheer precipice, twelve or fifteen hundred feet high, overlooking the valley, which extend several miles in every direction, and is thickly wooded with pines. On the west, a long line of pla-

teaus show horizontal terraces and lines of the strata. They are over two thousand feet high, and can be traced for miles, reaching across valleys over ten miles wide.

The "Great Cave," at Cave City, consists of a series of passages and chambers of great extent, worn in the rock by the solvent power of water holding carbonic acid in solution. Several of the chambers are lined with stalactites of great beauty, often reaching from the ceiling to the floor of the caverns, and thus form grottoes with alabaster-like walls. Nearly all the lime which is thus deposited is highly crystalline, and reflects back the light of candles from myriads of brilliant facets.

We proceed on to Mokelumne Hill, and talcose slate come into full view, which are traversed by quartz veins. The slates are light colored. Mokelumne Hill is one of the oldest places in the mining region, having been commenced in 1849, and it has been noted as one of the richest localities in the Southern mines. It is on the south of and over a thousand feet above the Mokelumne river. The mining is chiefly in a coarse drift of gravel and boulders, many feet below the surface. Leaving Mokelumne we descend a long hill to the level of the river, which is a stream of considerable magnitude, and flows slowly. We cross the river and traverse a broad plain towards Sacramento, which is located

upon the alluvial deposits of the river, and is surrounded by a levee to prevent inundations.

From Sacramento towards Auburn, the slope of the mountain is long and gently ascending. Granite crops out along the road about twenty-five miles from Sacramento. It is traversed by feldspathic, or coarse granitic veins, and weathers into large rounded blocks, which rest like great boulders on the surface. There appears to be a very thin layer of drift or auriferous earth in this vicinity. Beyond Auburn, the road immediately ascends a ridge formed of the vertical layers of clay slate. This formation continues to American river, which has cut its deep channel or cañon in it. The sides of the cañon are abrupt and precipitous. A long and tedious ascent on the other side of the stream brings us to Yankee Jims, a mining town, pleasantly located, about three thousand feet above the level of the sea. The auriferous drift, which has been well worked, is here seen to rest upon the upturned edges of slate. The banks are washed away, and the gold obtained by the "hydraulic method."

Forest Hill is an interesting mining locality on the north bank of the middle fork of the American river. The surface is covered with pine trees, and it slopes rapidly towards the deep cañon of the stream, which flows 2,500 feet below, the top of the hill being 2,800

feet. The underlying rocks here consist of light colored talcose slates. The tunnel or entrance to the celebrated mine of Deidsheimer, is cut through these slates for four hundred and twenty feet to the layer or drift containing the gold. The slate thus forms a rim or margin of a basin-shaped depression, in which the gold accumulated. The auriferous portion of the earth is found resting upon the edges of the slates. The "pay dirt," as it is called, consists, in great part, of fine and talcose slate mingled with fragments of the slate broken from the bed-rock. On sprinkling the surface of a heap with water, the gold becomes visible in yellow fragments, and flattened, bean-shaped masses. Masses of silicified wood and large trees turned into stone have been found in this vicinity.

Michigan City is a thriving mining town on the north side of the Middle Fork of the American river, and about 2000 feet above the stream. In June, 1852, the site was marked by but one little log cabin, and to-day it is one of the largest towns in the country. There is here a deep and widely extended deposit of auriferous drift, covering the underlying slate from view. Whole acres of this drift have been swept away by the miners to a depth of from ten to sixty feet, or down to the bed-rock of the slate. The gold is coarse, and appears to be distributed throughout the mass of the drift from the

surface to the bed-rock; it is most abundant at the bottom, but the drift "pays" throughout. The gold is not uniformly distributed. One claim has yielded $48,000 in five months. This was worked by nine men night and day, at an expense of $13,000, leaving a clean profit of $35,000. The usual yield is six to eight dollars a day (ten hours) to each man, but some claims pay twenty or thirty.

Passing to the valley of the North Fork, serpentine is observed outcropping. The surface is also strewn with great numbers of spherical or globular masses, which have been liberated by the weathering of the rock. The rock attains a great development, and forms a series of knob-like hills that are bare and barren. These bare tracts in the midst of a wooded region, are familiarly known as *Bumstone Plains*. The current of the North Fork is rapid. The south banks are nearly vertical and in some places are 2,800 feet high. The journey we are taking the reader conducts him to Iowa Hill, Placer County, where a thick deposit of drift is found, resting upon a bed-rock of grey granite. This granite, as exposed by the mining operations, is very much decomposed and softened to a great depth, so that, in many places, it can be removed with the pick or shovel. Whenever the auriferous drift is removed, the surface of the granite is found to be very uneven, a con-

dition which necessarily results from the manner in which the rock decomposes. At Grass Valley, located along the Boston Ravine, are a number of quartz mines and mills for the extraction of the gold. With a few exceptions, the quartz is mined at a distance of a mile or two, and carted to the mills. It is not common to find a mass of the quartz in which gold can be seen by the unassisted eye. But on placing a lump of the pyrites in nitric acid, for a short time, so as to partly dissolve it, gold becomes visible in numerous small points.

From Grass Valley to Auburn, the country is rolling and uneven, intersected by many small creeks. A few miles before reaching Auburn are the outcropping edges of argillaceous and talcose slates, and they form the bed-rock at Auburn. The drift is much rounded, and is not very coarse, but large masses of the subjacent slates are found with it. A considerable part of the gold that has been found here has been in coarse lumps; and masses weighing from ten to eighty ounces have been common. The prevailing formations from Auburn to the crossing of the North Fork of the American river are clay slates and talcose slates, standing nearly on edge, and traversed by intruded dykes of basaltic or trappean rock.

In this brief and rapid survey of the gold regions,

beginning at Sonora and running north, I have mainly endeavored to present an outline sketch, without presuming to go into any particulars. Neither have I attempted to give any view whatever of the more southerly mines, in which are included Gen. Fremont's celebrated Marriposa claim. There remain other localities to be described. But as these are the scenes of my own observations and my own labors, I omit any mention of them in the present chapter. Enough has been written to give the reader a general idea of the gold regions.

CHAPTER III.

FIRST EXPERIENCE OF MINING.

On the 5th of February, 1849, I left Boston for California, via New York, where I embarked on board the schooner Col. Fanning, arrived at Brazas Santiago, Mexico, February 26th; took steamer at the mouth of the Rio Grande, and arrived opposite Camargo, March 5th; left the 8th by horse and with pack mule for Mazatlan, on the Pacific, where I arrived April 17th At that place took passage with others who were pioneer mining emigrants, in the schooner Dolphin, for San Francisco. The craft proving unseaworthy, I obtained, June 10th, a passage on board the brig Paridisto, with a Genoese captain. Arrived at San Diego, June 19th, where I remained until the 30th of the month, when I took passage for San Francisco, arriving in the harbor July 20th. I remained but six days in San Francisco, and reached Sacramento on the 29th. Thus six months had nearly elapsed from the time I left Boston, before I found myself in the new land of

promise. I have thought it worth while to preserve these dates and to publish this brief itinerary, to show to later travellers the difficulties and delays, to say nothing of the dangers and expenses that beset the early emigrants. California lines, at that early period of emigration, were not very abundant, nor was steam communication in a very forward or flattering state. They who went forward in the early days, went expecting to rough it, and they were not disappointed in their expectations.

Sacramento at this date was built entirely of canvas houses and tents, with the single exception of Sam Brannon's old log store, near the landing. I left on foot, after tarrying but two hours, for Mormon Island. Voted 1st August for delegates to frame a State Constitution to meet at Monterey. This place is on the bank of the American river at the point where the foot hills of the Sierra Nevada become merged into the plains of Sacramento. It is not, in fact, an island, but a bar, the river having made a partial channel around it in time of high water; the deposits of gravel, boulders, &c., still show evidence of its connection with the banks. Considerable labor had been performed late in the preceding year, on the upper part of the Island or bar, by the Mormons from Oregon; and the place derives its name from this circumstance. The Mormons had

been eminently successful in their search for gold. It was variously estimated that they had taken out from a million to a million and a half dollars in value during their occupancy. At the time of my visit there were plenty of tents, and gold-washing was going on quite briskly. There were goods for sale, not abundant in quantity, and held at enormous prices. I commenced my career as a miner here, and it was here that I first received impressions, which have been confirmed by subsequent experience, in relation to the origin of the deposit found upon the bar. My idea was, and now, is that the gold was not washed there by the operation of the river, or if so, in a very slight degree; because, where the bar was fourteen feet deep, the deposits of dirt, gravel, &c., were discolored, of an iron-rust color, with a reddish tinge, in places, cemented and adhering firmly to the bed-rock. This appearance run through the whole mass from top to bottom. In other parts, more shallow, the deposit showed a pale color, as though it had been under water. The gold found here was mostly fine. It pervaded the whole deposit, but paid best upon the bed-rock.

After working upon the bar for a considerable time, I determined to try in the banks, toward the hills and high grounds, endeavoring to find where the gold came from. I first worked above the Island, on the left hand

side, up the stream, in the mouth of a sag, back of "Nigger Hill." I followed up and found gold at the base of the hill. I then commenced half a mile above the Island, right-hand side, and worked up a ravine about 200 yards from the river, and found deposits of gold all the way to that point. For another experiment, I prospected *above*, and found but little. Commenced back, where the quantity of gold began to diminish, dug into the right-hand bank towards the hill, and traced up gold, finding a piece that weighed a dollar. I exhibited this to the miners at the Island, who declared it to be the first piece dug of that weight in that locality.

The commencement of the cut was shallow, increasing in depth as I proceeded. But the distance was so great, and there was so much top dirt to be removed, I did not persevere; it would not pay. I next worked in the bank towards the old Burying Ground Hill, and from the river traced up a *lead* until it became so deep it caved in upon me. I was, therefore, obliged to abandon it. At this time, hill digging was not thought of by miners, or 'any other man.' It was an entirely new idea, regarded as an experiment, and was looked upon somewhat dubiously. Since that date "Nigger Hill" has been extensively worked, and it has paid well.

The hill near the ravine, which I have spoken of as being above the Island on the right-hand side, has

also been worked, yielding rich returns. Burying Ground Hill has likewise been worked, and rich deposits found. These hills are small in comparison with those higher up the American river and its tributaries — the Middle and North Fork; for as we penetrate towards their sources, we come into more mountainous regions.

I left Mormon Island for Coloma on the 2d of November, the place now celebrated throughout the world as being the seat of the gold discovery in California. The day was the commencement of the first storm of the terribly hard winter of 1849. I reached Coloma on the 5th. The hills along the South Fork of the American river, at Coloma, are not precipitous, but are rounded, and the valley has considerable width, so that many wide bars, or sand flats, are found. These consist of river-drifts, sand and gravel, and it is all auriferous. I immediately prospected in the hill above the town, but found nothing that would pay. I left the 8th for Georgetown, proceeded thence to Oregon Cañon, and pitched my tent near the mouth of Patterson Gulch, which I prospected and *named* the next day. It is situated one and a half miles north and westerly from Georgetown — called, originally, *Georges-town*, from Mr. George Phipps, the earliest settler. The town was made up of a few log-houses occupied as trading posts, and numerous canvas tents, for the

miners. There was not, at the time, a single live woman in the place.

Georgetown is beautifully situated on the dividing ridge between the South Fork and Middle Fork of the American river. It is about ten miles north-easterly from Coloma, fifteen miles westerly from Placerville, five miles easterly from Greenwood, and twelve miles from Volcanoville. It lies in latitude 38 deg. 30 min. N., and at an elevation of two thousand feet above American River Valley to Coloma. The ridge of high lands from American river to Middle Fork is some fifteen miles wide, and about thirty miles in length. It is made up of foot hills of the Sierra Nevada Mountains, some forty to sixty miles distant, in an easterly direction. It is interspersed with numerous streams of water, called creeks, cañons, gulches, ravines, &c. There are many deep gorges, with high, abrupt terminations of hills throughout; indeed, it may be said the country is mountainous, particularly along the Middle Fork, from the Spanish bar to the junction of that stream, and also upon the American river from Coloma up as far as gold is found in quantity to pay. This region I shall call Hill or Placer Diggings, where tunnelling commenced in 1851 – 2. The mining operations are chiefly in or under a deep deposit of drift or alluvium. The slates crop out along a ravine, but the top

of the hill is formed of deposits, which reach a thickness of two hundred feet. They rest upon a basin-like depression in the bed-rock, and the gold-bearing layer is at the bottom. In order to reach this, tunnels are cut in from the side of the hill, at such a distance below the summit, that the lowest parts of the basin will be intersected. To do this, it is necessary to cut through the outer or projecting rim of slate rock. A prospecting shaft is first sunk from the surface to the bed-rock, and the earth tested. If the result is favorable, a tunnel is commenced on a level with the bottom of the shaft, or at a lower point, and carried in so far as to intersect the shaft, or so as to strike the "pay dirt" at a favorable point.

The principal creeks around Georgetown are Cañon, Otter, Empire, Johnstown, and Rock Creek. Oregon Cañon, with its gulches, was very rich in auriferous deposits. It was discovered in the summer of 1849. Hudson's Gulch was discovered soon after by the individual whose name it bears. It was worked at its mouth in the fall of that year by him. It is about three hundred yards long, and was estimated to have paid in working the lead, the first time, about one and a half million of dollars. Patterson's Gulch empties into Oregon Cañon, one hundred and fifty yards below Hudson's Gulch. This has also paid well in coarse

slug gold. At the head of the Gulch are many quartz veins which have been opened and worked for years, paying well. There are quite a number of noted claims here, some of them of remarkable richness. Among the most noted are the Beattie, the Washington, and the Pacific.

The slate of the vicinity contains many auriferous veins. Quartz in cellular veins, apparently auriferous, has been found at the mouth of Washington Tunnel, and a short distance below the Mamaluke Tunnel, has been found a quartz vein, only a foot in width, very rich in gold. This quartz was so much stained and decomposed by oxide of iron, that it resembled the adjoining slate, and its presence was not suspected. The claim was worked as a placer deposit, but with little success. On taking out one panfull from the vein and washing it, gold became immediately visible, and nearly half an ounce was obtained. This was sharp, angular gold, mixed with the cellular quartz. The Beattie Quartz Claim has been worked for six years past by sluicing, without machinery. It has been a paying claim through the whole time. It has been worked to the depth of one hundred and fifty feet, paying as well, or better, at that depth than nearer the surface. There have been surface diggings at the head of this gulch as well as quartz.

Upon the south and east side of Hudson Gulch, and at its head is situated Patterson Hill, a claim which I have owned and worked, more or less, since April, 1852. I have not yet struck boulders and gravel in mass in this hill, nor found any quantity of smooth placer gold. But I have traced up this kind of gold and some gravel and boulders toward the top of the hill in six different places, showing a channel and occasionally smooth bed-rock. The gold found on the hill is of the same character as that dug in the gulch. This has been one of the richest gulches in the upper part of El Dorado County. I worked in the side hill in May, 1861, for quartz gold, and struck a vein of decomposed quartz with gold in it; gold of precisely the same character that I had found years before in the gulch and upon the hill-side below the quartz vein. This fully confirms to my mind, at least, the theory I had formed, that the gold comes down from the hills.

I have got good "prospetcs," in five other quartz veins in this claim, running through the hill.

CHAPTER IV.

MINING IN THE HILLS OF EL DORADO.

Cement Hill, a noted locality near Georgetown, for rich placer deposits, has been tunnelled, by no less than sixteen tunnels, only five of which pay. The Nevada tunnel is one of the most interesting. It is cut through about four hundred and fifty feet of slates, and then reaches the "lead." The gold obtained in this mine differs from that found in many other placers, being in small and regular scales, "indicating by its form," according to Prof. Blake, "that it was deposited in the bed of a river. This indication is verified by the character of the surface of the bed-rock; it is rounded and worn exactly as in the bed of a river, and here and there, large, loose boulders are found." "It is evidently," he says, "the bed of an ancient river." Above this auriferous deposit, we found a compact, brown clay, and also containing forest trees. Above this clay, how-however, there is a "cement" or mixture of clay, with volcanic ejections. A thin trap dyke traverses the slates.

In the early part of November, 1850, I commenced working in a gulch, an outlet of Cement Hill, — and men with rockers made from twelve to sixteen dollars a day each. I worked here a month. In October, 1851, a company was organized, consisting of one hundred members, for the purpose of working in the hill. We ran a tunnel 170 feet, striking into the basin. This proving to be too high, we ran another tunnel, forty feet lower in the rock, three hundred feet into the hill and sunk a shaft forty feet. Meanwhile the company had become reduced to six members, and the work was abandoned. Another company was organized, of twenty persons, and another tunnel was run on the last or south side of the hill; at the head of the gulch I worked in 1850. We laid the tunnel forty feet below the shaft just spoken of, and cut four hundred and fifty feet through solid rocks; but we failed to strike through into gravel. This tunnel cost about thirty-five dollars a foot. Nothing daunted with our want of success, we commenced back two hundred feet, and struck a side tunnel of two hundred and twenty feet in extent itself in the following manner: we cut the first one hundred feet on a level line, and the second one hundred feet on an inclination, ending the last, twenty feet perpendicularly. We here struck the bottom of the basin, in a channel. The channel was worked twenty-five hun-

dred feet nearly north, encountering boulders and gravel, — and about six hundred feet in breadth from east to west, showing conclusively a basin. The average depth of cement, boulders and gravel from the top of the hill to the bed-rock, was about one hundred and fifty feet. The gold found was all upon the bed-rock, or within a few inches of it. The first shareholders in this enterprise realized no pay for nearly three years.

We traced the remains of an oak tree in the basin some thirty feet. It was two feet in diameter at the butt. Petrifactions were found in this fallen tree which somewhat resembled silver in appearance, and others which bore a pale gold color. The petrifactions were laid in slabs, oftentimes two feet in length and several inches in thickness, running with the grain of the wood. A pine tree, also, was found twenty feet long, and many other sticks of pine and oak, besides, *Mancinita* wood, — the wood of a peculiar shrub, indigenous to the hills, — and pine burs were found in considerable abundance. The oak and pine trees were of the same classes and orders of the trees that are found growing all around upon the surface of the hill. There are several acres on the hill, directly over the basin, which are entirely denuded of timber, the cement being so hard, the roots of trees could not make their way in

it. The first two shafts were abandoned on this account, after having been sunk only a few feet. The clay under which the auriferous drift is found is a thick deposit, in which whole trees are imbedded. These are in a state of decomposition or change, and are dark brown, looking nearly as black as coal. The clay itself has a reddish brown or drab color.

Professor Blake, speaking of the Nevada Tunnel, says, after having given it a close and thorough examination; "the gold lies close to the rock, and in places has penetrated between the layers of slate to the depth of a foot or more. It is enveloped in a thin layer of very fine blue clay, derived, to all appearance, from the abrasion of the slate. The gold could be seen thickly implanted in this clay, and on the surfaces of the layers of slate from six to eight inches or more below the general surface of the bed-rock." The cost of working the Nevada Tunnel Claim was about one hundred and twenty-five thousand dollars. And notwithstanding it did not pay large dividends to us, I would like, as one of the original shareholders, to have another hill, equally as good to operate in, at this day. And I think all the old shareholders would say the same thing, 'or any other man,' who has knowledge of mining gained by experience.

The tunnels in Cement Hill which have paid for

working them, are the Nevada, Swiftsure, Black Hawk, Eureka and Roanoke. The Swiftsure tunnel is cut for one hundred and twenty feet in rock, and is four hundred feet in length. The hill is irregular in its formation, sloping off in all directions on the north and south one thousand feet. There is no connection of channel shown with any other land. It is situated one and a-half miles (one mile by air line) north of Mamaluke Hill, is about the same elevation with it, and there is a fall of over a thousand feet to Cañon Creek between them. The creek runs nearly east and west. There is no outlet from the hill on a level with the bottom of the basin. All the tunnels were run through the rim-rock several hundred feet to intercept and drain off water.

An account of the Mamaluke Tunnel Company may be interesting in this connection. I find one ready made to my hands by the geologist of a government exploring expedition in 1854, which I will first notice. He says: "The claim of the Mamaluke Tunnel Company is opened by a cutting at least 300 feet through the slates, before the gold-bearing earth is reached. This forms a layer not over two feet in thickness, and rests immediately upon the upturned edges of the slates. It is overlaid by a firm and homogeneous deposit of clay, which is said to be eighty feet thick, and without coarse

materials. It has a dull ash color, and contains a large quantity of pumice or volcanic ashes. Some of the masses, which have been removed in the course of mining, are traversed by cylindrical holes, looking like the casts of vegetation or roots that have since decayed and disappeared. In one of the specimens a perfect cast of a leaf was found. It is probable that this is a lacustrine deposit — the sediment of an ancient pond or lake that occupied a valley in the slates. What changes have been produced in the configuration of the surface of the region since the lake was drained!

It is said that the following succession of beds was found in sinking the shafts of the Bay State Company:

	FEET.
Surface accumulations, soil and gravel,	—
Gray argillaceous beds, with volcanic ejections, pumice, &c., ("cement,")	40
Auriferous gravel, ("pay gravel,")	8
Gray argillaceous beds, with pumice, ("cement,")	60
Auriferous gravel and clay resting on the slates,	—

It would appear from this section that there was an alternation of quiet and running water. The deposition of clay and pumice was interrupted by a swift current, bringing gravel and gold, and this current was probably similar to that which first spread the gold upon

the uneven surface of the slates. It is probable, also, that the current was sudden and powerful; for if it had flowed for a long time, the clay would have been swept away before the gravel was laid down."

The same geologist says, "that through the kindness of B. C. Currier, (a personal friend and neighbor of mine,) he was permitted to examine the mine of the Washington Tunnel Company, one of the best on Mamaluke Hill, and was allowed to test the accuracy of some of the statements regarding the remarkable richness of the deposits of the hill, by mining for a few minutes, on his own account, in one of the drifts. The surface of the bed-rock was worn perfectly smooth by abrasion, and a fine, white, talcose clay, and some gravel rested upon it. With a candle in one hand and a knife in the other, he picked away this earth, and threw out, one after another, beautiful water-worn lumps of gold. In ten minutes he had collected nearly an ounce."

What follows is based upon my own experience and observation. And it will be noticed, that, while my description is less ambitious, it is more minute. It will be observed, also, that, in regard to the richness of the hill, we do not differ.

Mamaluke Hill is, like Cement Hill, unconnected with any other land. Its elevation is some 400 or 500 feet above the bed of Oregon Cañon, which cuts its

north and northeastern boundary. South Cañon, as *Forty-niners* called it, — Illinois Canon as it has since been named, — particularly surrounds it from southwest to south, its head being southeasterly. Mamaluke is about one-quarter of a mile in length from north to south, with a breadth considerably less. Its entire area is rurrounded by a rim-rock, outcropping in some places, but mostly covered up by the masses thrown off from the basin in the hill. The surface is alluvial, intermixed with lava in a state of decomposition. The lava is of a reddish cast, many feet thick in depth. There are large masses of this material thrown off in Mormon gulch, which resembles, in some places, the slag seen about iron furnaces, showing that when originally deposited it was in a state of fusion, and that, in cooling off, it was left in masses from three to fifteen feet deep. There was a good lead of gold in the gulch that came out of the hill. The gold is of the same kind, and is found in the same colored material as that in the hill itself. I worked Mormon gulch from the fall of 1851 to the spring of 1853. The largest piece I found weighed eleven dollars. Lumps were found in the hill, however, which weighed over one hundred dollars.

There are some twenty tunnels run into the hill, varying from 300 to 1000 feet, through the rock, before the basin is reached. The deepest shaft sunk in the hill

is 127 feet, through soft and hard cement, mostly of dark gray color. The hard cement we call rock-cement. It is so hard that blasting is necessary to remove it. These layers are stratified, lying in a horizontal position, as do also the different layers of boulders and gravel. There are boulders large and small, through this mass of cemented lava — for I can call it nothing else. Boulders and gravel of a smooth character are found several feet thick upon the bed-rock in the basin. In and under the gravel on the bed-rock run the *leads* of gold, which are narrow in some places, only a few feet, while in other parts of the basin they are full fifty feet or more. There appear to be different veins of gravel: one we called the blue lead, the color ofthe rock forming it ; others are gray and dark. Towards the outside, shallow part of the basin, the gravel is dark brown and red, precisely like that found outside of the rim-rock. A portion of the layers of boulders and gravel contain quartz. And the formation whence the most gold is obtained is where we find the most quartz, gravel, &c.

There is an upper layer of gravel in the hill, of reddish cast, nine or ten feet in thickness. I sank a shaft on my claims, on the north slope of the hill, eighty-six feet, and struck this layer of gravel at seventeen feet from the top, leaving sixty-nine feet before I reached

the bed-rock. I was first engaged in mining here in company with others. I then concluded to work on my own account, having nine claims, sixty feet square each. I sank four hundred and fifty feet of shafts. One shaft, eighty-six feet to bed-rock, cost upwards of one thousand dollars, wages being from $5 to $8 a day. I also run tunnels of the aggregate length of four hundred and fifty feet into these claims. There were twenty tunnels cut through rock into the basin and struck gravel. Several of these were very rich. Among those which paid best were Black Hawk, Mamaluke, Washington, Bay State, Porcupine, Independence, Wisconsin, Eureka, Antelope and Union.

The amount of gold taken out of the hill was estimated by miners who owned and worked there, at from three to three and a-half million dollars up to 1857. A considerable amount has been taken out since that date, but no very extensive tunneling operations have been prosecuted. The fountain-head or source whence this large amount of gold had its origin yet remains untouched, at the bottom of the basin, in the quartz veins, and is yet to be operated upon. Mamaluke has been one of the richest hills, of its size, in diggings of this character, in El Dorado County. Patterson Hill is one-half mile north from Mamaluke, in the direct line of quartz veins and in the range of Cement Hill. It is

yet to be extensively embowelled by the usual modes of operation. I am firmly convinced that with patience and perseverance, and a little sweet oil, if you will, I shall be rewarded from the gold product of this hill for all my toils, and get even with the country for all my time and labor and money expended in it.

CHAPTER V.

THE ORIGIN OF THE GOLD DEPOSITS.

There are some disagreements among geologists touching the origin of the deposition of gold. In one thing they are agreed, viz.: that gold occurs in clay slate, mica and chloritic slate, as well as talcose slate, and but rarely in granite. Professor James Blake looks to the diluvial deposits of California as the principal source from which the future supplies of gold are to be derived. And he says, speaking of the diluvial deposits, in "Silliman's Journal," Vol. 13, p. 390: "The principal geological interest attached to these diluvial deposits is the evidence they afford of that portion of the mountain chain on which they are found, having been at the bottom of an ocean at a comparatively recent period, and also that it must now be many ages since the country has been the seat of any great disturbance. The elevation they here attain, (probably four thousand feet above the level of the ocean,) would indi-

cate a considerable rise in the level of the land on this part of the continent. A more extended examination will undoubtedly identify them by their organic remains, with the diluvial drift found on the eastern portion of the continent, and which is so extensively developed in South America along the eastern slope of the Andes. The origin of these deposits, or the locality from which they have been brought, presents a question of great interest both to the geologist, and also to the miner, for on its solution most probably depends the discovery of a region where auriferous quartz must exist in large quantities. Many of the localities in which they are at present found, abound in veins of auriferous quartz, and it is possible that the gold which these deposits contain, has not been carried far from the spot where it was originally thrown up; but the great abrasion that large boulders of the hardest rocks have been subjected to, evidently indicates that they, at least, must have been carried a considerable distance by powerful currents, and it is probable that the gold has been carried with them. Should they have come from the higher mountains to the east, rich gold bearing veins must be found in this direction."

As regards the mineral riches of these deposits, "gold," he says, "is found wherever they exist. The ravines, coming from the ridges on which they are found, are

generally extremely rich and always contain gold, even in places where the deposits themselves have been worked without success: in some places where they have been worked, as much as thirty thousand dollars have been taken from a claim of fifteen feet square, and there are many instances when ten and fifteen thousand dollars have been taken out from claims of the same size. When these deposits are found extending over a large surface on the elevated flats, gold is always met with, generally diffused through the gravel immediately above the rock on which they rest. In the valleys in the lower hills, and even on the plains to the west of them, where they are extended over vast tracts of country, these deposits are still auriferous, the gold being very generally diffused, and found in greater quantities the deeper they are worked." These facts, he concludes, as to the quantity of gold found in the diluvial deposits, "are sufficient to prove that they must be the chief source from which the gold found in the country has been derived. Some undoubtedly has been set free by the gradual disintegration of the rocks containing auriferous quartz, but this can afford but a small quantity in comparison with the treasures that must have been spread over the bottom of the ocean that existed when the alluvial deposits of the upper hills were formed. And when we consider the extreme

richness of many parts of those small portions of its bed that still remain *in situ*, and then attempt to form an estimate of the treasures that must have formerly existed in it, when it occupied many thousand times the space that is now covered by the deposits that have yielded all the gold already taken from the country, we are led to the conclusion that much more extensive deposits of gold must exist in California than any that have yet been worked. These deposits are undoubtedly to be found in the diluvium in the lower valleys, and on the placers at the foot of the mountains, and will afford a supply of gold that it will take centuries to exhaust."

Contrary to this view, Professor James D. Dana, who was attached to the United States Exploring Expedition, in "Notes on California," Silliman's Journal, vol. 7, for 1849, says: — "Alluvial washings, the world over, have been the principal sources of the precious metals. Among the Russian mines, (which in 1846 yielded $16,000,000,) the rock is mined only at Ekaterinburg. The sand or gravel of a gold district, as that of California, is the rock ready pulverized by natural causes (wear from waters and decomposition); and it is thus made ready for the further operations of the miner. The streams of water washing over this soil, still farther and in the preparation, by collecting the

gold into the bottom of valleys, and carrying off the light gravel and sand (these being seven times lighter than gold), thus leaving the grains of metal along the beds of streams and the bottom of ravines.

"The region covered by the debris of the California mountains, is as wide as the vast prairies of its long reaching rivers, and the slopes that rise into the ranges on either side. The gravel of these slopes and the stratified earth and gravel of the plains may, therefore, contain gold. But the parts more nearly in the vicinity of the gold-bearing rocks, naturally prove most productive; moreover, different layers in the soil, where they are the result of successive distribution, may differ widely in their yield. Again, as above stated, the gold will be collected most largely when the streams running through the earth or gravel have performed to some extent the washing process, the gold settling, while the earth is removed.

"On the east stands the Sierra Nevada, covered largely with snows, a perpetual source of water for streams. Consequently, the Sacramento receives from their side numerous tributaries, and into these tributa ries a large number of rivulets flow along the ravines, and into the rivulets numberless rill from the hill sides. The last mentioned, from their steepness, carry the earth and whatever it contains into the ravines; the

rivulets, also steep, leave along their bottoms part of the gold; but carry on another large part and much earth; while the large tributaries transport principally gravel and earth, leaving the gold to settle most abundantly towards their upper parts, though distributing the finer grains along their whole course. The American Fork (emptying near Sutter's, about ninety miles from the sea), Feather river with its many affluents, (entering twenty miles further north), and other streams, from their sources in the moutains, have long been engaged in this washing process. The occurrence of alluvial gold commonly in flattened grains arises directly from the forms it has in the rocks, and partly from the wear and tear to which the whole is subjected. The abrading and battering action of the moving waters and gravel, besides setting loose the disseminated particles of gold, tends to reduce the leaves or laminæ to scales, breaks up the strings of metal to fragments, and wears off the rough exterior of the larger lumps."

Prof. Wm. P. Blake, Geologist and Mineralogist to the Exploring Expedition under Lieut. R. S. Williamson in 1853, after giving a general view of the Gold Region, says: —

"There are many varieties or modifications of the auriferous drift, or, we may say, of the deposits of gold. We find:

"First. We find great boulder like drifts, the result of great abrasion and powerful currents in a great body of water.

"Second. A river drift, or coarse alluvium, ancient and modern.

"Third. Alluvial deposits on flats and over broad surfaces. Not confined to river channels.

"Fourth. Lacustrine deposits — at the bottom of former ponds or lakes.

"The deposits of the first class are very irregular, and differ in their manner of deposition at different localities. The observations were sufficient to show that, in many cases at least, the accumulations are extremely local, and that they were not transported from a great distance. Deposits of this class contain coarse lumps and grains of gold, and are found on the high table lands or 'divides,' between the rivers, often at an elevation of over twenty-five hundred feet above them.

"The river drift containing gold, appears under a variety of forms: — it may be either coarse or fine; but is found of all ages, from the accumulations now forming in the beds of the streams, and in bars, to the deposits of rivers which formerly flowed over the surface twenty-five hundred feet higher than now. The courses of such ancient streams are discovered by miners, and followed by them in their underground

explorations. All the peculiarities which the beds of rivers present — the water-worn surfaces, pot-holes, and fine scale gold — are found in them.

"The rich deposits of gold found in the thin layer of gravel and clay, spread over broad areas or 'flats,' are mentioned as forming a third class. They differ from the linear deposits formed by streams, and yet they appear to be the result of a continuous current passing over the surface. In many instances such deposits give evidence of having existed as a marsh or swamp, or as a low district, inundated at times by rivers, and serving as a repository for their suspended alluvium. In many of these deposits, however, the masses of gold are quite heavy, and the grains as coarse as those in the first class of deposits. It is probable that the gold was deposited with a thick layer of drift, which was afterwards swept away, leaving the gold behind.

"The deposits of the fourth class, called *Lacustrine*, are found in extensive basin-shaped depressions in the surface of the metamorphic rocks. These depressions have evidently been filled with deep and quiet water, from which thick strata of clay, fine sand, and volcanic ashes, have been deposited upon the auriferous layer at the bottom. The deposits at Georgetown and Cement Hill are examples of this class. They are more nearly allied to the alluvial deposits of the 'flats,' than to

either of the other forms under which the auriferous drift appears.

"Great changes have been produced in all these deposits by denudation and erosion during and since the elevation of the region to its present level. The old rivers changed their beds; lakes were drained, and new streams cut their way through great deposits of coarse drift, through lacustrine deposits, and across the ancient river courses. But the action of the denuding streams has not been confined to the superficial deposits, either auriferous or tertiary; they have eroded great valleys and canons in the underlying rocks, both of granite, limestone, and slate; all are cut through and traversed by long valleys nearly transverse to the trend of the rocks. These valleys of erosion are on a most magnificent scale, and may be regarded as deep ravines in a formerly unbroken plateau or slope.

"On the forks of the American River, these eroded valleys are from fifteen hundred to three thousand feet deep, and the traveller who desires to cross from one bank to the opposite, must wind in a zigzag line down one side, and in a similar manner up the other. All this erosion has taken place since the original deposition of the gold; and it is probable that the gold of the streams is derived from the original deposits of coarse drift rather than from the action of the rivers upon the

veins, although a very considerable quantity of gold must have been liberated from the veins by their action.

"All the observations upon the auriferous deposits sustain the conclusion arrived at by Sir Roderick I. Murchison, after his explorations in the Urals, — that the formation of gold is, geologically speaking, very modern; that it is one of the most recently formed metals; the rocks being probably impregnated with it after the Miocene period, and but a short time before the epoch when the powerful and general denudations took place which destroyed the large extinct mammalia. Although, as before observed, the relations of the auriferous drift to the older or tertiary strata at the base of the Sierra Nevada are not yet clearly shown, it is believed that the marine strata containing Miocene fossils are free from gold. Gold is found under horizontal strata of great thickness and extent, but it will probably be found that these deposits are comparatively modern."

CHAPTER VI.

ORIGIN OF GOLD DEPOSITS CONTINUED.

In the preceding chapter I have given the views of three eminent geologists upon the origin of the gold deposit. They not only do not entirely agree, but they differ upon very material points. I will now proceed to give my own views. Geologists and miners generally have promulgated the idea, and endeavored to establish it as a fixed principle, that the hills of California were, at some remote period, at a much higher elevation than they now are, and that they have been washed away by inundations, the force of currents, &c. This I do not believe. I can see no evidence that the hills have been acted upon by water in their present formation. In some instances their elevation may have been reduced a few feet. But the accumulation of vegetable mould where timber is found, — and timber predominates on the hills, — is equal to any waste that the seasons may have occasioned. This process of

accumulating vegetable mould has been going on for ages. I am speaking, of course, of what has been in progress since the formation of gold deposits. The rock crops out at the top, and on the sides of most of the hills where boulders and gravel are not found; and it is natural, as a primary formation, showing no evidence of wash, it being rough on the surface. This characteristic prevails all over the country.

The rocky sides of creeks, rivers, canons and gorges, if cut down by water-currents, would, unquestionably, show smooth side-rock from top to bottom, even for a mile in height, an elevation that is reached along the Middle Fork and South Fork of the American River. But there is no such appearance. We only find smooth bed-rock where the boulders, gravel, &c., have come down sideways from the hills. There is no channel smooth side-rock, above high water mark, nor even so high as that, upon the Middle Fork from Spanish bar to American bar. I can see no evidence, anywhere, that the channels were cut by rivers, through rock, from mountains and hill-tops to their present beds. I should be sinning against light and knowledge to say to the public what I cannot believe myself. My firm conviction is that the water-worn channels of these rivers or creeks, canons, gulches, &c., never were twenty feet higher, if they ever were ten feet higher than their present beds.

In this connection I must speak of parallel or side-channels, that run for short distances back of river banks. These have been scooped out, as it were, by the weight and force of deposits from higher acclivities which, in their downward progress, disturbed the bed-rock for various lengths and depths, leaving a rim-rock in front, forming the dividing parallel line between the river, and, as it is called, the back channel. These channels may extend along as great a length as the breadth of the mass from the hill or mountain side. But they are like the basins in the hills, having no outlet on a level with the bottom of them on either end. These channels do not "show," that is, they are not manifest, until they are drifted into or washed off by sluicing. They are covered from hill to river bank, and the channels are sometimes as low, or even lower than the river channel. The same colored cemented mass is found here, on the surface, as that in the hills, with paler gravel and boulders on the bed-rock. These back channels are not continuous, and are only found where the deposits are traceable to the hills. This remark applies to creeks, canons, gulches, &c., in a greater or less degree, as old miners can very readily remember.

In the summer of 1851, I worked for some time about Volcano Bar, on the Middle Fork. This bar

was celebrated for having the largest deposit and the hardest rock-cemented gravel and boulders ever found in that part of the country. This cement is of a bluish or gray color, and adheres so firmly to the bed-rock that we excavated several inches in it rather than attempt to obtain the gold by separating it. I worked a claim at the Falls, at the lower part of the bar. The rock here was high in front at the river side. I drifted back twenty-five feet, and struck into a channel ten feet or more lower than the front, and twenty feet wide. From this point the bed-rock raised back toward the hill-side for seventy or eighty feet, the gold deposit running out with cement and gravel. There was a kind of sag or cove back in the hill. I worked some dirt higher up and got a prospect. This satisfied me that the lower deposits came from sources higher up than where they were found. The next year some miners struck a deposit still higher in the hill, which was far richer than any that had been found on the bar.

These back channels were well developed at Green Horn Slide, Yankee Slide, Sandy Bar, Nigger Bluff, Gray Eagle, Mad Canon, and many other places along the Middle Fork; also about Georgetown, Canon Creek, Georgia Slide, Oregon Canon, Sailor Slide, South Canon, and at Patterson's Slide. The latter slide I worked and sluiced off in side hill to the depth

of thirty feet. Fir trees were growing upon it that were full two hundred feet high. It opened on to a channel, deeper than the main channel bed of the canon. I might enumerate many other places of which I have personal knowledge, and in which I have operated, but I have no disposition to tax my readers by multiplying examples. The remarks here made will apply to diggings of a like character in the mountainous and hilly regions all over the State.

SMOOTH GOLD.

Let me now call attention to smooth gold, and endeavor to give some satisfactory solution as to how it was formed, whether it was washed by water, or was deposited where it is found in a state of fusion. The prevailing opinion, from the commencement of gold digging in California, as well among geologists as miners, is, that gold in its smooth, rounded shape, was formed by the action of water passing over and around it; also, that it has been transported from time to time, from long distances, by currents of water along rivers, creeks, &c., and from the heads of canons and ravines, long or short distances, as the case may be, to their mouths or outlets.

Now here is a question of deep interest, requiring a more elaborate explanation than I am able, perhaps, to

offer. My conclusions, however, are offered with the confidence that years of experience have given. And though they may not be expressed in the language of the academy, or clothed in scientific formulas, they will be, at least, the results of a practical knowledge, gained by patient and laborious efforts.

That rough, coarse, porous, and even fine quartz gold may have been carried along by water, is a fact which no sensible miner has reason to doubt. The evidence of it is before him in his daily sluicing operations, when working where those descriptions of gold abound. It being more bulky and lighter than some other forms of gold deposits, the water more readily acts upon it than upon the round, solid, or tabular formed gold, which sinks the most readily, leaving the lighter particles to be carried yet further in the running water.

In our early mining operations, the '49-ers used the rocker and washed by hand. Our greatest fear was that the gold would be washed away and lost. So, to avoid this dreaded wasteage from our claims, we cut side ditches to carry the water off. We have reference now to shallow surface diggings, such as are found in canons, gulches, and ravines. These shallow deposits best suited the ideas of miners at that period. We did not dream of risking our heads under-ground, or in very deep excavations. Besides, this was the cheapest

gold dug. We could realize more for a day's work, and were sometimes munificently rewarded.

In the summer of 1850, the old "Long Tom" came into use; and soon after additional sluice-boxes. This process was regarded with close but cold scrutiny by some, and by others it was considered madness to think of running six or eight inches of water through the boxes, expecting to save any gold after such a torrent. We were, however, soon converted from our indifference and unbelief, for we found that the heavier particles lodged first in the sluice, requiring to be raked down by hand, in cleaning up at the lower end of the sluice. The finer particles of dust and scale gold may be carried a great distance, when the deposits containing it are loosened and exposed to strong currents of water; but round, smooth gold never, unless it is where falls occur, or the bed-rock is precipitous.

How were the basins and channels in the hills formed? My theory and firm conviction is, they were formed by volcanic action; and I trust I shall be able to deduce some facts that will satisfy my readers in this respect. It will be remembered that the masses of cement, boulders, gravel, &c., are stratified and of different colors in the basin, as are the strata of the outside. The upheaving procesess have been as many as the strata that indicate them. Ages have doubtless

elapsed while the formations have been taking their present shapes. At the different eruptions the quartz veins and other rocks have been broken from the sides of the crater, and they became rounded by this action. The bowels of these volcanoes have been in a state of fusion. And gold, in a native state — being discharged from the quartz vein, is converted into a state of fusion at each upheaval in the crater — has been thrown off in a molten state with the other volcanic masses, cooling in its way, and settling down upon bed-rock and vegetable matter. In this way, by the action of fire and volcanic force, and not by the action of water, do I account for the different forms which gold takes.

A nugget weighing *fifty-two* ounces was found in Hudson's Gulch, shaped like a solid sphere, with a neck to it that, in my judgment, never could have been formed by water. A smooth nugget, which weighed thirteen pounds, was found on the side-hill back of American Bar, Middle Fork. This was not washed there by water, as the river never reached that point. I saw a nugget which was said to have been found in the Scott river diggings, which was of the same shape as that just alluded to, found in Hudson's Gulch. This elongated sphere was perfectly smooth, and weighed fifteen pounds of clear gold. I have obtained specimens of gold bearing impressed upon their surface

leaves of the *Gold Plant*, with every fibre as distinctly traced as if the tracery had been done by plastic wax. Similar specimens have been found in Mad Cañon, and Ladies' Cañon, a place to which miners have given a number of *aliases*. All manner of shapes and forms are given to gold in this way, because of its previous molten state, and no theory of the influence of water upon the gold, can satisfactorily account for the varied positions and shapes in which it is found.

I account for the fact that gold specimens are perfectly smooth in some localities about hill-diggings, while in other localities the specimens are marked and scratched, in this way: In some of the upheavings from the basin, or crater, the gold settled and cooled off, the cement cooling off with it, covering it up from contact with any other moving masses. In other places, the gold has cooled and lodged upon the bed-rock, the cement passing on, leaving it bare and liable to be raked by the masses of the next overflow. I take it for granted, that many of the volcanic discharges were barren of gold, because there are layers, as we have seen, in which no trace of gold is discernible.

The globular shaped gold, so universally supposed to have been washed by water, indicates on its surface that it received its present shape while cooling from a state of fusion. As before remarked, some quite

large nuggets have been found of smooth surface and nearly round, and innumerable smaller nuggets from the size of a filbert down to a pin's head. But most of the smooth gold is a flattened mass, as if it had been thrown off in a melted state, and while cooling spread a little, leaving each mass or nugget wider than it is thick. In many instances pieces are long and narrow and quite thin, yet with rounded surface. Many pieces have every appearance that, while the metal was in a plastic state, it fell upon underlying substances which gave the pieces the particular forms and impressions in which we find them. Thus some fell on vegetable growth, and hence the impression on nuggets, such as we have described in some we have seen, that bore the impress of the leaf of the gold plant. In general, however, the melted particles fell on hard materials, such as sharp points of quartz, gravel, cement, and other matter, which caused the indentations which we see, and accounts, too, for the adherence of parts of the quartz and other substances to the gold. In short, we find, our theory, of the fusion of the metal when it reached its present place of deposit, is fully sustained by the analogous forms and shapes it bears to melted silver, or lead thrown out violently, dropping upon similar beds and substances.

In Hudson's Gulch there was found gold in what we

called the "Black Lead." The gold was coarse slug, varying in size from one ounce to twenty-five ounces, of every variety of form, yet rounded always; but so blackened and crusted that it was thrown off in the tailings of washings in the rocker as of no account. There was not the slightest indication of gold about it, except its specific gravity. Certainly men of far more experience than we then had, would not have thought of looking for the precious metal in those blackened and uninviting masses. The error of throwing it away was not continued, you may be assured, any length of time. I traced up gold of precisely the same general description into Patterson Hill, from the Falls in the gulch. There was a depth of eight feet of black cemented lava over this lead for several rods from the falls and down the gulch, which had to be removed by picks, and broken by sledge hammers, the gold being really all upon the bed-rock in quartz and some other gravel.

CHAPTER VII.

STRUCTURE OF THE GOLD-BEARING RANGE.

"THE structure of the eastern wall of the valley of the Sacramento," remarks Professor Newberry, Geologist of a Government Expedition in 1855, "has not yet been fully made out. It is, for the most part, composed of the same geological constituents as the coast mountains, having an origin due to the same general system of elevation, and probably nearly the same date, *i. e.*, subsequent to the deposition of some of the tertiary strata. I should be disposed, however, to regard the Sierra Nevada as having had an existence, and the greater part of the range having been above the level of the ocean previous to the deposition of the San Francisco sandstone, which is so characteristic of the coast mountains, and which, if it can be identified in the Sierra Nevada, is probably confined to its flanks, at a low level.

"A metamorphic limestone is found at intervals

throughout all that part of the Sierra Nevada which skirt the California valley. Its age has not been determined, as it is generally highly crystalline and metamorphic, and contains no fossils. From its relation to the limestone discovered by Dr. Trask, near the base of Mount Shasta, and which is of carboniferous age, one may suspect it to belong to that era.

"The great mass of the Sierra Nevada is composed of plutonic or volcanic rock, granite, gneiss, mica schists, and porphyrys, trap, trachyti, &c., with auriferous talcose slates and veins of quartz. These strata having been extensively broken up, and eroded by aqueous or glacial action, have, in the re-arrangement of their constituent materials, given rise to the *placer* deposits which skirt the base of the range. The deposition of this comminuted material has apparently been effected by aqueous agency, and controlled in a degree, by the law of gravitation, as the gold, the heaviest of the component materials, is found at, or very near the bottom. The surface of the plain which lies between these ranges of mountains is underlaid by beds of transported material — gravel, clay and tufaceous conglomerate — several hundred feet in thickness, which were once deposited as sediments on the bottom of the trough, but have been extensively re-arranged by the present water courses; and in many places subjected to considerable disturbance from volcanic action."

Professor Newberry continues his observations northward. From the fact that other portions of California and Oregon had proved to be so rich in gold, special interest was excited in his exploration of so much new territory by the anticipation that he might discover other localities in which the precious metal might be obtained. In no part of the region he traversed, however, after leaving the Sacramento valley, was he able to detect any good evidence of its existence. Nearly all the portions of the route were found to be covered by accumulations of recent volcanic matter by which the underlying rocks were as completely concealed as though the whole country was buried under a heavy bed of snow.

In many localities were exposures of metamorphic slates, but nowhere talcose in character, or containing veins of quartz, which would be the repositories of gold. In almost every stream an effort was made by "panning" to obtain "the color," but uniformly without success. At the point where the exploring party left Pitt River, the boulders of quartz and other rock found in the bed of the stream, led to the supposition that, at some point higher up in its course, the rocks might be found which usually contain it. The metamorphic slates there exposed had a more promising appearance than elsewhere, and in that vicinity Professor Newberry

obtained the only trace of copper which he saw. From these circumstances he was led to believe that here, if anywhere on the route, valuable deposits of metal might be discovered. In the Klamalt and Des Chutes basins the surface is either occupied with plateaus, or hills of trap, or by stratified tupas, or by infusional marls. "Gold mining," concludes Professor Newberry, in this connection, "is carried on in most parts of California empirically, and it is worth an effort, on the part of those who may have the opportunity, to determine the law upon which the accumulations of gold in that region depend."

Crossing the Sierra Nevada, upon the east side, we find that a silver-bearing range lies along the western river of the Utah basin. It has been ascertained that a straight line, running north and south, with a slight bend to the east and west, would pass near Black Rock, Virginia City, Mono Lake, — already known as silver-bearing regions — and the site of the silver mines on the Mohave, giving rise to the presumption that all these localities are but additional links in the great mineral chain of Arizona and Mexico. Indeed, its natural features and appearance throughout, indicate the presence of the precious metals, and give color to the conjecture that a metalliferous region range along the

east base of the Sierra Nevada, keeping at about the same distance from its crest as the gold belt on the western side. In Carson Valley, on Walker River, and at Mond Lake, are good surface diggings, while at places still further south, rich quartz ledges have been met with, some of them equalling the best ever found in California. To say nothing, therefore, of the actual discoveries made in the vicinity of the mines, opened at Washoe, it is pretty clear there exists an argentiferous as well as an auriferous region, both to the north and south of that region.

These are the conclusions that Mr. Degroot, a writer on the Washoe silver mines in Western Utah, arrives at. With regard to the country, which is divided on the south and west from California by the Sierra Nevada mountains, he says: "the geology and mineralogy is as yet but little known. Granite, scoria and volcanic rocks abound, and basalt occurs on the slopes of the mountains; sulphur and salts of various kinds are abundant. Warm and boiling springs are everywhere met with, indicating the proximity of igneous agents. Gold mines, he says, of considerable richness have been worked since 1850, at various points along Carson River, and recently silver ore of unexampled value has been found, extending over a large scope, the area of which is likely to be augmented by further explorations."

Mr. Degroot further remarks, concerning Western Utah. "It is a region of varied geology and strong meteorological characteristics. A land of contrasts, extremes, and apparent contradictions; of mingled barrenness and fertility, beauty and desolation, aridity and storm. Growing side by side is the cactus and wild plum, while issuing from the same orifice are hot springs and cold; the water of the one pure and healthful, of the other nauseating and unwholesome.

"In passing over this strange country, one is impressed with the idea that he has come too soon. Every thing seems crude and unfinished about him; all nature wears a primitive aspect. The rocks — the vegetation — all things are in a transition state. The traveller feels as if he had intruded upon the solitudes of nature before she had fitted them for his reception, or adapted them to the wants of civilized man. Western Utah may be said to be a region of volcanic origin, and geologically speaking, of recent formation."

The same general features that are observable in Western Utah, are observable in the auriferous region of California. And it may with truth be said that all that part of the continent is of volcanic origin. If this be so, why not account for the presence of auriferous drifts on the west, and argentiferous drifts on the east of the Sierra Nevada, through igneous agency rather

than through aqueous agency; through the force of fire, upheaving the precious metals in a state of fluidity, rather than through the force of powerful and inundating bodies of water? In the one case, by admitting the igneous theory, the origin of the gold is at once accounted for; whereas in the other case, admitting the aqueous theory, we can only say that gold is in the places where we find it, leaving the origin to be accounted for.

It is very evident to my mind, that geologists have yet to give a satisfactory geological account of these interesting regions. Along the sides of the mountains, lining the Utah basin, are often long lines of lava, deep gorges, and the marks of land-slides; while over the plains are scattered blocks of basalt, scorias, conglomerate and drift. The walls of the basin consist of various mountain ranges; that on the west being the east slope of the Sierra Nevada, which, instead of falling off with a gentle declivity, as on the California side, drops with a violent pitch, forming a barrier of great height. The stratification of the rocks are also peculiar, and have a general strike and dip different from those on the Pacific side. The character of the mines are also unlike those of California.

Now here are two regions not very widely apart, but connected in general character by a mountain range,

yielding the same metals, bearing the same kind of rock, presenting the same general peculiarities, both evidently of volcanic origin, and differing only in the abruptness of the pitch on the eastern side and the stratification and general strike and dip of the rocks. Here are questions of deep interesting moment for geologists to investigate. Let them first start with the igneous origin of the gold-bearing rocks as a basis for their investigations, and they cannot fail, I think, to arrive at solutions that will throw a flood of light upon the science, which, though young, has already so widely enlarged the boundaries of our knowledge. And while deferentially submitting these questions to geologists, I will propose another that opens a broad field of inquiry and investigation. At any rate, it offers a reasonable suggestion for observation. It is this:

That quartz veins are composed of several different kinds of matter, differing totally and entirely from other rock productions in the country. This fact is well known to all observing men. Miners who have worked and operated upon quartz, almost daily for years, have noticed its peculiarity in this respect. There is something in the composition of the quartz that is fusible, and it has been ignited through its combustible components, as well as, perhaps, through the agency of the electric fluid acting on those components.

This idea of the composition of quartz may yet suggest some different method of working it from that now in use, for the purpose of extracting the precious ore it contains. Quartz, crushed under the present method, and yielding two cents a pound in gold, or forty dollars a ton, is accounted quite rich. Rev. T. Starr King, who has visited the mining region, after mentioning the almost universal failure of mills that were erected in the season of wild speculation, alludes in ridicule to the case of the Bunker Hill mine, in Nevada, where, he says, "A man who pretended to be an assayer and chemist, induced the company to build huge furnaces out of fire-brick, at a dollar and a half apiece. What for? To melt the quartz and find the gold at the bottom of the molten mass, when it had cooled. This was actually tried; the result, of course, zero, plus a heap of slug." There was, undoubtedly a radical defect in the mode of procedure, but the object arrived at was not, in my opinion, so much entitled to ridicule. And it may be that object will be gained in a short time, through the agency of heat,—creating as great a revolution in the working of gold-bearing quartz, as steam has created in the industrial arts.

We find rounded rocky masses in the basins. The quartz runs in parallel lines with the talcose slate. Consequently the operation of causes that produced the

rounded rocky masses, acted more readily upon the veins of quartz exposed endways than if they had been placed sideways. Further: — The quartz veins in and extending from the basins either way, are very often, I may say generally, much discolored to the distance of several hundred feet. Some of them are blackened; others are of a brownish hue; others, still, of an iron gray cast, presenting every appearance of discoloration by extraneous heat, not unlike the effect produced upon iron about a furnace.

I have already recorded my opinion that the inherent combustible materials of the quartz veins, are the sole causes to which we can attribute the effect above indicated.

This brings me to the conclusion I have formed concerning canons, deep gulleys, creeks, &c., with which miners in hill and placer diggings have so much to do. The canons are filled up with various depths and deposits of gravel, boulders and rocks. The same remark applies to ravines and gulches. The underlying smooth bed-rock upon which they mostly rest, has acquired its smooth surface in consequence of the gravel and boulders having passed over it at different periods. In later periods, the lodgement of heavy masses of cement, rocks, &c., coming down from the hills, covered the bed-rock, leaving it in the condition in which we find it to-day.

I am aware that "a happy combination of knowledge of crystallographic mineralogy and chemistry is required for the promulgation of new views respecting the minerals, whose varied, yet often repeated association, is the result of volcanic activity." But I am also aware, upon the high authority of Von Humboldt, that geologists and the scientific world are still in great uncertainty respecting the composition of volcanic rocks, and respecting the association of mineral species which characterize their trachytes (rough stone.) "The variety of formations, broken through by volcanoes," remarks Humboldt, "are geologically no less important than are the substances which they produce." That the auriferous fields of California are of volcanic origin has been shown conclusively, I think, in the foregoing pages. Humboldt affirms that the entire circuit of the Paciffc Ocean, is surrounded, throughout a length of 26,400 geographical miles, by a series of recognizable monuments of volcanic activity. Rocks belonging to ancient volcanoes described, found in the coast range of California, have been described by geologists; and they will yet come to see that the gold itself is of an igneous origin, as well as the rocks which they have described. I do not affirm that all volcanic upheavals are gold-bearing; but I do affirm that the gold of California has a volcanic origin.

CHAPTER VIII.

ADVICE TO NEW BEGINNERS IN MININIG.

THAT there is untold wealth in the gold-bearing regions of California, is a conclusion which all scientific and practical men have arrived at. The bowels of the land teem with the precious metal. If hundreds of millions of dollars have been taken therefrom, thousands of millions remain. Heavier deposits and richer placers are yet to be opened to view. But their wealth is not to be obtained without peril and sacrifices, and disappointments and arduous labors. Nature locks up this, the most precious deposit which the earth bears, in such difficult places, that bold men and enterprising, daring men and patriots, industrious men and enduring, must labor hard and long before they force the treasure forth. Doubtless, rich deposits and heavy nuggets yet remain, larger than any that have hitherto been found; very likely some new adventurer will strike upon a *lead* that shall pay them more in a month than was ever

realized before by the most successful diggers. Gold does not lay, however, in large masses ; nor, when great values are massed together, is the pile a great one. A cube of fourteen feet would contain more than all that the California miles have yielded, and a cube of sixteen feet would contain all that California and Australia have yielded.

I wish to offer a few words of advice to men who are intending to go to the mines to seek for gold.

It is not, of course, expected of me that I shall presume to direct miners where they shall commence, or point out any particular place as best suited for their future operations. The auriferous regions "are all before them, where to choose, and Providence their guide." There is a territory in which to operate that equals New England in size. And as adventurers will take their own view of the country, and scatter in all directions, it is of little use to say more on this point than that in the land of gold-bearing earth and rocks you can hardly go wrong, and may chance upon rich diggings that have hitherto been concealed from the inquiring gaze of preceding miners.

I would advise, however, that new beginners be not over sanguine in their expectations of realizing sudden wealth. Fortunes are as uncertain, and as dearly earned where the land yields gold, as elsewhere. And

though some may make fortunes in a day, as it were, these are but exceptions, which go to establish the rule that fortunes come in slowly, as they do in other pursuits. The times when golden ore was gathered by the shovel-full are passed away, and with them, I trust, that reckless, daring, defiant spirit which was engendered among the miners. Yet there still remain unexplored fields of operation, that will bring out such results from their discoveries as rewarded many of the old '49-ers.

Let me, for convenience sake, sum up, in a few words, my own plan of operations, an observance of which, new beginners will find of imperious necessity to them.

The original gold deposit is in the hills from which the surface or placer gold was thrown.

By tracing up from the small beginnings, and prospects in the flats, canons, bars, &c., and then working and following them up towards the higher grounds, as long as any "color" or prospect can be found, you may be sure you are pursuing the right course.

Sometimes the "*prospects*" run out, and the *lead* cannot be followed. Indeed, this almost universally occurs, when we attempt to find Hill Diggings, and the reason is this: there is always a barren spot between the main deposit in the hills and that found below, at the

base and sides of hills. Occasions are not unfrequent when there is scarcely a trace of gold in working up the side-hills, after leaving the deposits in the low ground. The side-hills are mostly rock, often bare, and in places covered with broken rock and dirt, commonly found upon side-hills everywhere. In such cases the miner should examine very closely the last trace of gold found, and note very minutely the kind and color of gravel, clay, dust, or the wash it was last found in. He should then seek for a similar material, and resume his explorations with confidence, when the *lead* will again be found.

There is a considerable difference between the north and south sides of hills, in regard to the materials found upon their surface. The north sides, in general, are covered with heavy growths of firs and other trees, besides undergrowths of various kinds. Hence the covering of earthy matter is deeper here than on the south sides. This is a natural consequence from the fact that the long continued droughts of the country operate less severely upon the north sides, which are sheltered by the timber, and are not exposed to the scorching rays of the sun in the dry season. The south sides are subject to extreme heat and fierce rays, in the dry season, and their moisture is so destroyed; trees, nor no kind of vegetation, grow with anything

like the vigor that is found on the north-side; they are thus left more exposed to the freezing and thawing of winter, and to the washes of the rainy season.

The bed-rock of the south-sides, then, is mostly bare, and the material thrown off from its surface, finding less obstruction than that on the north-sides, more readily finds its level in the creeks, canons, ravines, &c., upon the bars and along the banks of rivers.

These remarks are applicable particularly to the mining localities of El Dorado County, in its northern section, but will apply to the hilly districts all over the State.

The canons, gulches, ravines, and creeks, in the hilly parts, are the receptacles of all the substances that have passed down from the hills. And when gravel, boulders, &c., constitute a considerable portion of these substances, gold is commonly found. Sometimes the finer particles are mixed through them, nearly from the top to the bed-rock, while in some localities gold will be found upon the bed-rock only — coarse slug-gold, more particularly, in the mining districts about Georgetown.

Canons, creeks, &c., are of various lengths, often extending for miles from their outlets to their sources. Here again, as in the side-hills, a *lead* oftentimes runs out and disappears, while the canon keeps on and other

leads may come in above. Here is a point of very great importance; so I repeat the directions given in regard to *leads* in side-hills: — Examine very closely the last trace of gold found, and note minutely the kind and color of gravel, clay, dirt, and wash it was found in. Then commence examining the banks on either side for the same material, for the gold may come in from both side-hills, or only one, at this point.

Sluicing off the surface dirt, and laying the bed-rock bare, is the most advisable course of procedure; it shows more readily evidence whether wash and cement have passed over the bed-rock from a higher source. The evidence is smooth places and points of rock, and frequently narrow or wide channels, as the case may be, which are, in general, worn smooth. This, however, depends upon the grade of the hills.

When this is the fact, there is no difficulty in following the channel up, whether there is much gold found or not, as the smooth rock and washings are sufficient evidence that the original head of the deposit was in the hill.

In all cases where these deposits are traceable up hill-sides, there is a basin, or, as it has been termed, channel, containing more or less of the same kind of material that has been found below. And universally there is heavier and coarser gold found in the basins than in the canons and flats.

I am well satisfied of the foregoing facts from my own operations. The gold found in hills, flats, &c., that are composed of gravel, boulders, and other material, is called by the miners *washed gold*, it being smooth and rounded, but in every possible shape.

The Quartz Gold, in its native or rough state, is ragged, open, and porous. This kind of gold is found in the quartz veins, which stand perpendicularly, and extends through the hills nearly north and south. In some of the veins the gold is interspersed through the solid quartz-rocks; in others the rock is in a state of decomposition, and the gold readily falls out, and has been for ages passing off. Thus, as the rock wastes away, it falls down the side-hills, and finds its level in like manner to the surface or placer gold.

By following the principle and plan of operations I have laid down, miners may pursue their daily labor with a tolerable degree of certainty that they will neither grow hungry nor naked. And by following on in the way of well-doing, they cannot fail of acquiring something in their pockets more than a daily subsistence. Be not too easily discouraged or disheartened at the outset, nor give up the ship even when it looks most squally ahead, and all around you is dark and unpromising. But show, by your perseverance and energy, and endurance, to your friends whom you have

left at home, that in the lexicon of your mining life, *there is no such word as fail.*

This has been the rock on which too many have split. Miners of perseverance, patience, a good share of prudence and watchful economy, have usually succeeded, and come out bright, while others, by carlessness, imprudence, and improvident habits, have failed, and then charged the mines with their failure, or ascribed their break-down to ill-luck. Luck in the mines waits on industry, prudence, and perseverance.

I would advise new miners, when they go into localities that have been worked, to examine first, how operations have been carried on by those who have been there before them, and profit by their labor; for it is very easy to discover how and where the *leads* of gold ran, by the excavations; and largest operations show, commonly, where the most gold was found.

Thus, by comparing notes with what I have given by way of directions to them, they can be enabled to judge, with some degree of certainty, where to pitch in and bring out the precious deposit they so much desire to meet all their wants.

APPENDIX.

WEATHER TABLE FOR CALIFORNIA FOR THE YEAR 1853.

JANUARY.

Friday,	1.	Rain slightly.
Saturday,	2.	Clear and warm.
Sunday,	3.	" " "
Monday,	4.	" " "
Tuesday,	5.	Rainy night, cloudy day.
Wednesday,	6.	Rainy day.
Thursday,	7.	Rainy afternoon, hard at night.
Friday,	8.	Rain.
Saturday,	9.	Cloudy.
Sunday,	10.	Rain.
Monday,	11.	Clear and warm.
Tuesday,	12.	" and pleasant.
Wednesday,	13.	" severe frost.
Thursday,	14.	" and mild, rain at night.
Friday,	15.	" and mild.
Saturday,	16.	" and beautiful,
Sunday,	17.	" it froze last night.
Monday,	18.	" and pleasant.

Tuesday,	19.	Clear and cool.
Wednesday,	20.	" " " frosty night.
Thursday,	21.	" " pleasant.
Friday,	22.	" " mild.
Saturday,	23.	" " warm.
Sunday,	24.	Cloudy.
Monday,	25.	Clear and mild.
Tuesday,	26.	" "
Wednesday,	27.	Cloudy, rainy afterternoon.
Thursday,	28.	" sprinkled rain.
Friday,	29.	Clear and warm as summer.
Saturday,	30.	Rain last night and this A. M.
Sunday,	31.	" " " " "

FEBRUARY.

Monday,	1.	Clear and mild, frost last night.
Tuesday,	2.	" " beautiful weathar, frost.
Wednesday,	3.	" " mild.
Thursday,	4.	" " pleasant.
Friday,	5.	" " mild, frosty nights.
Saturday,	6.	" " frosty morning.
Sunday,	7.	" " warm as summer.
Monday,	8.	" " cold.
Tuesday,	9.	" " cool.
Wednesday,	10.	" " cool, with frost this morn.
Thursday,	11.	" " mild, some flying clouds
Friday.	12.	" " mild.
Saturday,	13.	" " cool.
Sunday,	14.	" " "
Monday,	15.	" " mild.
Tuesday,	16.	Cloudy most of the day.

Wednesday,	17.	Clear and warm.
Thursday,	18.	" " "
Friday,	19.	Cloudy and rain.
Saturday,	20.	Clear and cold, wind off the mountains.
Sunday,	21.	Clear A. M., cloudy P. M.
Monday,	22.	Cloudy.
Tuesday,	23.	Rain A. M., cloudy P. M.
Wednesday,	24.	Cloudy and rainy.
Thursday,	25.	" and sprinkled rain.
Friday,	26.	Rain and little snow.
Saturday,	27.	Clear and cold.
Sunday,	28.	Cloudy and hazy, quite cool.

MARCH.

Monday,	1.	Clear and mild.
Tuesday,	2.	Clear and warm.
Wednesday,	3.	" " "
Thursday,	4.	" " " as summer.
Friday,	5.	" " "
Saturday,	6.	" " very warm.
Sunday,	7.	" " some cooler.
Monday,	8.	Rain.
Tuesday,	9.	Raining violently all day, and hail.
Wednesday,	10.	Cloudy and very cold, spits snow.
Thursday,	11.	Clear most of the day, cold.
Friday,	12.	Snow squalls, and very cold.
Saturday,	13.	Clear and cold.
Sunday,	14.	Clear A. M., cloudy, cold, and rain P. M.
Monday,	15.	Snow and then rain.

Tuesday,	16.	Clear and cold.
Wednesday,	17.	Cloudy and cool.
Thursday,	18.	Clear and cool, a most violent thunder storm, very large hail stones fell about 3 A. M., many as large as a hen's egg; freezing late.
Friday,	19.	Clear and clold.
Saturday,	20.	" " mild.
Sunday,	21.	" " warm.
Monday,	22.	" " "
Tuesday,	23.	Rain and hail, very cold, P. M. high wind.
Wednesday,	24.	Clear and very cold, hard frost last night.
Thursday,	25.	Clear and cold.
Friday,	26.	" and cool, rain at night.
Saturday,	27.	Rain violently all day.
Sunday,	28.	Rain.
Monday,	29.	Rain storm, violent all day.
Tuesday,	30.	Clear and mild.
Wednesday,	31.	" " " frost this morning.

APRIL.

Thursday,	1.	Clear and pleasant.
Friday,	2.	" " warm.
Saturday,	3.	" " beautiful.
Sunday,	4.	" " warm.
Monday.	5.	" " very warm.
Tuesday.	6.	" " " "
Wednesday,	7.	" " " "

Thursday,	8.	Clear and very warm.
Friday,	9.	" " " "
Saturday,	10.	" " cool.
Sunday,	11.	Rain and cool.
Monday,	12.	Clear and cool.
Tuesday,	13.	Rain afternoon, thunder.
Wednesday,	14.	Clear and cool.
Thursday,	15.	Clear and cool, very cold nights.
Friday,	16.	Clear and warm.
Saturday,	17.	Rain, hail and thunder, violent all day.
Sunday,	18.	Clear and mild, vegetation coming forward rapidly.
Monday,	19.	Rain.
Tuesday,	20.	Rain afternoon.
Wednesday,	21.	Cloudy and cold for April.
Thursday,	22.	Clear and cool.
Friday,	23.	" " warm.
Saturday,	24.	" " pleasant.
Monday,	25.	" " cool.
Tuesday,	26.	" " "
Wednesday,	27.	" " warm.
Thursday,	28.	Rain, hail and some snow; very cold for the last of April.
Friday,	29.	Snow storm at night and forenoon.
Saturday,	30.	Slight showers, quite cool for last of April.

MAY.

Sunday,	1.	Clear and cool.
Monday,	2.	Rain P. M., and night.

Tuesday,	3.	Clear most of the day.
Wednesday,	4.	Clear and warm.
Thursday,	5.	Clear and very hot.
Friday,	6.	Clear and warm.
Saturday,	7.	" " "
Sunday,	8.	" " beautiful.
Monday,	9.	" " very warm.
Tuesday,	10.	" " " "
Wednesday,	11.	Rainy day.
Thursday,	12.	Rain.
Friday,	13.	" slightly, cloudy day.
Saturday,	14.	Clear and cold, very cold nights.
Sunday,	15.	" and very cold for May.
Monday,	16.	" and very cool.
Tuesday,	17.	" and warmer.
Wednesday,	18.	" and warm.
Thursday,	19.	Thunder shower P. M.
Friday,	20.	Rain all day.
Saturday,	21.	Cloudy most of the day.
Sunday,	22.	Clear A. M., thunder heard.
Monday,	23.	" most of the day.
Tuesday,	24.	Cloudy and hazy most of the day.
Wednesday,	25.	Clear, but cloudy mording.
Thursday,	26.	Cloudy and wind.
Friday,	27.	Clear and warmer.
Saturday,	28.	" and then flying clouds.
Sunday,	29.	Rainy all day.
Monday,	30.	" moderately great part of day.
Tuesday,	31.	Cloudy and cool most of day.

JUNE.

Wednesday,	1.	Clear with flying clouds.
Thursday,	2.	Cloudy and sprinkled rain, P. M.
Friday,	3.	Clear and warmer.
Saturday,	4.	" " hot.
Sunday,	5.	" " warmer.
Monday,	6.	" " "
Tuesday,	7.	" " "
Wednesday,	8.	" " "
Thursday,	9.	" " mild, very cold at night.
Friday,	10.	" A. M., a shower P. M.
Saturday,	11.	" and cool, very cold nights.
Sunday,	12.	" with cool wind.
Monday,	13.	" and warmer.
Tuesday,	14.	" " warm.
Wednesday,	15.	" " very warm.
Thursday,	16.	" " " " also nights.
Friday,	17.	" " " "
Saturday,	18.	" " " hot.
Sunday,	19.	" " " warm.
Monday,	20.	" " " "
Tuesday,	21.	" " " hot.
Wednesday,	22.	" " " "
Thursday,	23.	" " " "
Friday,	24.	" " " "
Saturday,	25.	" " cool with high winds.
Sunday,	26.	" " thin flying clouds.
Monday,	27.	Clear and cool, frost in low grounds.
Tuesday,	28.	" most of day, very warm P. M.
Wednesday,	29.	" and very hot.
Thursday,	30.	" " " warm, P. M. wind.

JULY.

Friday,	1.	Clear and warm.
Saturday,	2.	" " very hot P. M.
Sunday,	3.	" " " warm.
Monday,	4.	" " " "
Tuesday,	5.	" " hot.
Wednesday,	6.	" " very sultry.
Thursday,	7.	" " " hot.
Friday,	8.	" " not quite so warm.
Saturday,	9.	" " warm.
Sunday,	10.	" " so warm.
Monday,	11.	" " pleasant.
Tuesday,	12.	" " mild.
Wednesday,	13.	" " "
Thursday,	14.	" " warm.
Friday,	15.	Clear and very warm.
Saturday,	16.	" " " "
Sunday,	17.	Cloudy and very hot, sprinkled P.M.
Monday,	13.	Clear and very hot, flying clouds.
Tuesday,	19.	" and warm.
Wednesday,	20.	" and hot.
Thursday,	21.	" A. M., cloudy P. M.
Friday,	22.	" and very warm.
Saturday,	23.	" and hot.
Sunday,	24.	" and very hot.
Monday,	25.	" " " "
Tuesday,	26.	" " " sultry.
Wednesday,	27.	" " " hot.
Thursday,	28.	" " " sultry.
Friday,	29.	" " " hot.
Saturday,	30.	" " " "
Sunday,	31.	" " " "

AUGUST.

Monday,	1.	Clear and mild, some wind.
Tuesday,	2.	" " cooler.
Wednesday,	3.	" " warm.
Thursday,	4.	" " hot.
Friday,	5.	" " "
Saturday,	6.	" " very warm.
Sunday,	7.	" " mild.
Monday,	8.	" " "
Tuesday,	9.	" " cooler.
Wednesday,	10.	Clear and mild.
Thursday,	11.	" " cool nights.
Friday,	12.	" " mild.
Saturday,	13.	" " cool for August.
Sunday,	14.	" " very warm.
Monday,	15.	" " cool nights.
Tuesday,	16.	" " warm.
Wednesday,	17.	" with exception of 5 min. rain.
Thursday,	18.	" with much wind.
Friday,	19.	" and warm.
Saturday,	20.	" and mild, some wind.
Sunday,	21.	Clear and very warm.
Monday,	22.	" " hot.
Tuesday,	23.	" " very warm.
Wednesday,	24.	" " " hot.
Thursday,	25.	" " " "
Friday,	26.	Cloudy, A.M., sprinkled rain, sultry.
Saturday,	27.	Hazy and sprinkled rain.
Sunday,	28.	Clear and cooler.
Monday,	29.	" most of day.

Tuesday,	30.	Hazy, with flying clouds — coldest day for three months.
Wednesday,	31.	Clear and very cool.

SEPTEMBER.

Thursday,	1.	Clear, and some wind, very cold at night.
Friday,	2.	Clear, A. M., cloudy, P. M., slight thunder shower.
Saturday,	3.	Clear and warmer, cold nights.
Sunday,	4.	Clear and warm.
Monday,	5.	Clear, and very hot.
Tuesday,	6.	" " " "
Wednesday,	7.	" " " "
Thursday,	8.	" " " "
Friday,	9.	" " warm.
Saturday,	10.	" " "
Sunday,	11.	" " "
Monday,	12.	" " "
Tuesday,	13.	Cloudy most of day, sprinkled, P.M.
Wednesday,	14.	Clear and mild.
Thursday,	15.	Rain until 2 o'clock, P. M.
Friday,	16.	Cloudy, and sprinkled rain.
Saturday,	17.	Rainy till 7, A. M., clear, P. M.
Sunday,	18.	Clear and warm.
Monday,	19.	" " "
Tuesday,	20.	" " very warm.
Wednesday,	21.	" " " hot.
Thursday,	22.	" " " "
Friday,	23.	" " "

Saturday,	24.	Clear, much cooler.
Sunday,	26.	Clear and cool.
Monday,	26.	" " "
Tuesday,	27.	" " much cooler.
Wednesday,	28.	" " warm.
Thursday,	29.	" " very warm.
Friday,	30.	" " " "

OCTOBER.

Saturday,	1.	Clear and very warm.
Sunday,	2.	" " " hot.
Monday,	3.	" " " sultry.
Tuesday,	4.	" " " "
Wednesday,	5.	" " "
Thursday,	6.	" " "
Friday,	7.	Clear most of day, clouds P. M.
Saturday,	8.	Clear and warm.
Sunday,	9.	" " much cooler.
Monday,	10.	Rain, last night, slight this A. M.
Tuesday	11.	Clear and cooler.
Wednesday,	12.	Hazy, with flying clouds.
Thursday,	13.	Clear and cool.
Friday,	14.	Clear and warmer.
Saturday,	15.	" " warm, flying clouds.
Sunday,	16.	" " "
Monday,	17.	Clear, A. M., cloudy, P. M.
Tuesday,	18.	Flying clouds and sunshine.
Wednesday,	19.	Clear and warm.
Thursday,	20.	" " pleasant.
Friday,	21.	" " warm.

Saturday,	22.	Clear and some flying clouds.
Sunday,	23.	" " very warm, smoky atmosphere.
Monday,	24.	Clear and pleasant.
Tuesday,	25.	" " cool, with wind.
Wednesday,	26.	" " "
Thursday,	27.	" " mild.
Friday,	28.	" " warm.
Saturday,	29.	" " "
Sunday,	30.	" " "
Monday,	31.	" " "

NOVEMBER.

Tuesday,	1.	Clear and warm as June.
Wednesday,	2.	" " "
Thursday,	3.	" " mild.
Friday,	4.	" " "
Saturday,	5.	Flying clouds and threatning rain.
Sunday,	6.	Cloudy nearly all day. Cold wind.
Monday,	7.	Clear and very cool.
Tuesday,	8.	Cloudy, with S. E. wind.
Wednesday,	9.	" began to rain 5 o'clk P. M.
Thursday,	10.	Rain, A. M., hazy, P. M.
Friday,	11.	Clear and cool.
Saturday,	12.	" " warm.
Sunday,	13.	Cloudy, and rain at night.
Monday,	14.	Rainy day.
Tuesday,	15.	Clear and mild most of day.
Wednesday,	16.	Rain, moderately.
Thursday,	17.	Cloudy, A. M.. clear, P. M.
Friday,	18.	" and cool.

Saturday,	19.	Cloudy and mild.
Sunday,	20.	Cloudy most of day.
Monday,	21.	Clear most of day; hazy.
Tuesday,	22.	" and mild.
Wednesday,	23.	" " warm.
Thursday,	24.	Cloudy and warm.
Friday.	25.	Raining violently all day.
Saturday,	26.	Rain all day.
Sunday,	27.	Raining violently all day.
Monday,	28.	Cloudy all day.
Tuesday,	29.	" " "
Wednesday,	30.	Clear and very warm for Nov.

DECEMBER.

Thursday,	1.	Clear and warm as May.
Friday,	2.	" " very warm.
Saturday,	3.	" " " "
Sunday,	4.	Warm, A. M., rain, P. M.
Monday,	5.	Cloudy most of the day.
Tuesday,	6.	Clear and very warm.
Wednesday,	7.	" " " "
Thursday.	8.	" " "
Friday,	9.	Rain most of day, and last night.
Saturday,	10.	Rain all day, last night.
Sunday,	11.	A. M., Cloudy, rain, P. M.
Monday,	12.	Cloudy, A. M., rain, P. M.
Tuesday,	13.	Rainy some part of day.
Wednesday,	14.	Clear most of day.
Thursday,	15.	Clear and cool, froze a little last night.

Friday,	16.	Clear and pleasant, froze a little last night.
Saturday,	17.	Clear.
Sunday,	18.	" very warm.
Monday,	19.	Cloudy most of day.
Tuesday,	20.	Rain moderately and last night.
Wednesday,	21.	Clear and mild.
Thursday,	22.	" warm as spring.
Friday,	23.	Cloudy, wind S. E., A. M.
Saturday,	24.	Snow. It rained some, snow fell two inches.
Sunday,	25.	Clear and cool, Christmas.
Monday,	26.	Cloudy and mild.
Tuesday,	27.	Clear and mild.
Wednesday,	28.	Rain in afternoon, moderately.
Thursday,	29.	Clear and mild.
Friday,	30.	" " cold.
Saturday,	31.	Clear.